FAT SHARK
RC VISION SYSTEMS

ATTITUDE V2 FPV GOGGLE
WITH TRINITY HEAD TRACKING

USER MANUAL

Revision B 12/23/2013

For more product information, please visit:
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Introduction

Congratulations on purchasing the Fat Shark AttitudeV2 FPV video goggles with integrated NexWaveRF 5G8 wireless receiver and Trinity (3-axis pan/tilt/roll) head tracking technology. To ensure your continued enjoyment, please take the time to thoroughly read through this operating manual before using.

Product Compatibility

The AttitudeV2 has been designed to adhere to established video standards and is compatible with any product also adhering to accepted video standards. Due to the high number of different manufacturers and variation in quality, it's impossible to for us to have tested with every product combination and some troubleshooting may be required if mix/matching components. The AttitudeV2 has been thoroughly tested with ImmersionRC gear. For best results and no compatibility issues, Fat Shark recommends ImmersionRC gear for your accessory products.

IMPORTANT!!!! Product Warning!!!!!

DO NOT LEAVE HEADSET EXPOSED TO DIRECT SUNLIGHT. SUNLIGHT WILL MAGNIFY THROUGH THE OPTICS AND BURN HOLES IN THE LCD COLOR FILTER THIS WILL NOT BE COVERED BY WARRANTY. KEEP GOGGLES IN PROTECTIVE CASE WHEN NOT IN USE

Product contents

Carry case

AttitudeV2 Headset

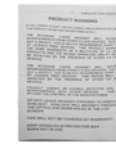
Data cables
- 3.5mm JR
- Futaba 6P
- ezUHF MiniDIN

AV cable

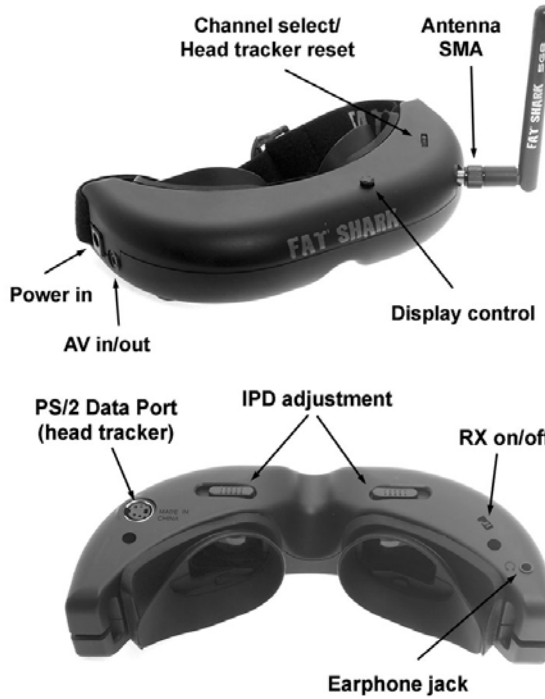
Downlink kit
- 250mW 5G8 TX
- 600TVL camera
- Filtered battery

2X 5G8 3dBi antenna

Manual



Controls Diagram



Controls

Brightness/contrast control: pressing left and right increases/decreases display contrast. Press forward/back increases/decreases brightness.

RX power switch: The receiver module power is controlled by this switch. Turn off RX module to avoid video conflict with video source via the AV cable.

Channel select: Rocking the channel select switch forward and back will cause the channel to incrementally increase/decrease. Audio beep sounds on channel change. A long beep sounds on channel top and bottom limits.

Note: Fat Shark only guarantees compatibility with Fat Shark or ImmersionRC transmitters.

CH1: 5740 MHz CH2: 5760 MHz CH3: 5780 MHz CH4: 5800 Mhz
CH5: 5820 MHz CH6: 5840 Mhz CH7: 5860 MHz

Head tracker menu/reset:
Activated by a vertical press on the channel rocker switch.

Low battery warning: Audio warning if input voltage drops below 6.8V

Volume control: There is no volume control - volume level is set at high. Please use with adjustable earphone accessory for volume control.

Trinity Head tracker

For a complete and up to date list of compatible RC radios and their setup, a head tracking sticky thread is maintained at www.FPVlab.com under SPONSORS GATE/FAT SHARK

Operation notes:

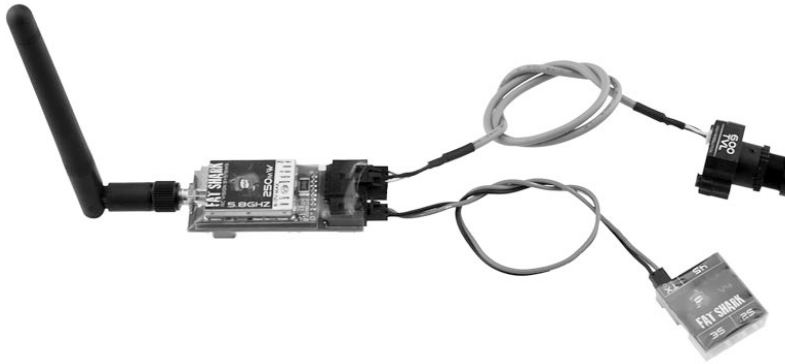
Head tracker initiates in pause mode. Head tracker reset button needs to be depressed and held to start camera motion. Default range motion is normal. Your radio may support extended motion but may result in errant behavior.

Menu navigation and settings:

Beep code	**Mode**
1 short beep:	P/T/R on ch 5/6/7
2 short beep:	P/T/R on ch 6/7/8
3 short beep:	Long beep then enter P/T only channel setting sub menu 1 short beep: P/T only on ch 5/6 2 short beep: P/T only on ch 5/7 3 short beep: P/T only on ch 5/8 4 short beep: P/T only on ch 6/7 5 short beep: P/T only on ch 6/8 6 short beep: P/T only on ch 7/8 No selection: exit menu
4 short beep:	Long beep then enter reverse servo direction sub menu 1 short beep: reverse pan direction 2 short beep: reverse tilt direction 3 short beep: reverse roll direction No selection: exit menu
1 long beep:	adjust servo center point: press to gain manual control of the camera with the headset. Adjust camera to desired center position and press button to set new camera center. Note that if your servos are not near the center point before adjusting, the servo travel may be limited in one direction.
1 short beep:	Long beep then enter pan ratio sub menu 1 short beep: ratio = 1:1 2 short beep: ratio = 1:1.5 No selection: exit menu
2 short beep:	Long beep then enter tilt ratio sub menu 1 short beep: ratio = 1:1 2 short beep: ratio = 1:1.5 No selection: exit menu
3 short beep:	auto pause on/off (if movement exceeds 90 degree, put HT in pause mode)
4 short beep:	Long beep then enter motion limits sub menu 1 short beep: standard range = 1.04 ms – 2.0ms (center = 1.52ms +/- 0.48) 2 short beep: extended range = 0.8ms–2.24ms (center=1.52ms +/- 0.72) No selection: exit menu
5 short beep:	Long beep then enter cycle time sub menu 1 short beep: standard cycle (8CH PPM, 20ms) 2 short beep: rapid cycle (3CH PPM, 8ms) No selection: exit menu
6 short beep:	Restore factory defaults
2 long beep:	no selection made, automatically exits menu

Downlink Overview (Camera, TX, Power)

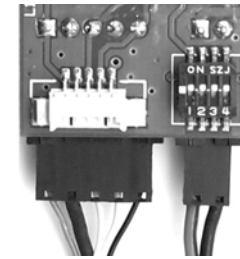
Downlink system comes preassembled and tested for plug/play with your aircraft. Simply connect the balance lead of your 2S, 3S or 4S (7.4V - 16V) RC battery to provide power to your Fat Shark Downlink and you are ready to fly.
The handy balance lead filters RC servo and motor noise from your RC pack for a crisp, clear image.



Transmitter

Channel select chart:

	1	2	3	4
Ch1 5740 MHz	On	On	On	N/A
Ch2 5760 MHz	Off	On	On	N/A
Ch3 5780 MHz	On	Off	On	N/A
Ch4 5800 Mhz	Off	Off	On	N/A
Ch5 5820 MHz	On	On	Off	N/A
Ch6 5840 Mhz	Off	On	Off	N/A
Ch75860 MHz	On	Off	Off	N/A



WARNING: DO NOT POWER TRANSMITTER WITHOUT ANTENNA ATTACHED. NO ANTENNA LOAD WILL DESTROY RF AMPLIFIER – NOT COVERED BY WARRANTY
Small white connector on back of transmitter is for ImmersionRC Tiny Telemetry. See accessories.

Camera

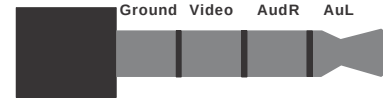
2.8mm lens for wide angle 100 degree FOV; ideal for fixed camera piloting.
Camera is NTSC/PAL selectable (PAL default, remove jumper on back for NTSC).
Plugs camera directly into TX via included cable (pre assembled).

Power (via discharge filter supply)

The discharge filter supply allows you to power your downlink equipment from your onboard RC pack. Connect as shown below:

AV in/out Port

RCA Connector: Yellow: Video, White: Audio Left, Red: Audio Right



Recording Video

Connect AV cable to AV out port on right side of headset. Connect recording device to cables and set up as per manufacturer directions.
Note: Cables pins are not all the same (see above chart), be sure to connect to headset using the included cable.

Using an external receiver:

Use the AV cable to connect headset to the RCA AV port of external devices.
To share the base station power supply with your goggles, pick up a 3m Dominator AV cable accessory from your retailer. Note; internal receiver must be shut off to properly display external AV.

Accessories

Pan/Tilt/Roll Mechanism

Get the most out of your Trinity head tracker by mounting your camera onto the pan/tilt/roll mechanism. PTR mechanism includes mount for 600TVL CMOS and Fat Shark CCD cameras. Pan axis servo is a true 180 degree metal gear servo for maximum travel motion durability. Super high tolerance tooling and servos ensures no slop or movement for steady camera action.

1000mA Battery Pack

The Fat Shark dog bone shaped 1000mAh pack seats securely in the headset strap pocket. The battery cable extends out of the top of the pack to avoid contact with head strap. Barrel connector cable features high strand count wire for flexibility and long life. Wire stress is minimized by the additional rubber gasket around the cable exit. No special charger is needed as balance leads have been added for charging with standard RC chargers (battery includes discharge lead adapter for advanced chargers). Note: this battery can still be charged via the barrel connector with the original Fat Shark headset battery charger.

Diopter lens

For near sighted users, diopter lens insert sets are available that include -2, -4 and -6 dpt. See below inserting location. Lens orientation is not critical.

Adjustable Earphones

For simplicity and minimalist controls, the AttitudeV2 does not have volume control. Audio is outputting at max volume and needs to be adjusted to comfortable level via adjustable volume earphones.

SpiroNET Circular Polarized Antenna

The best performance enhancement for your dollar. SpiroNET circular polarized antennae are manufactured to machine tolerances and final tested with top end RF equipment for the best performing CP antenna on the market.
CP antennae naturally reject multipathing (biggest cause of 5G8 video breakup) and have no mismatch polarization when your aircraft banks – resulting in no rude range losses during acrobatic flight.

Tiny Telemetry From ImmersionRC

Conventional OSDs offer a host of features, some of which you don't need if you're just flying FPV around your local field or have a small and light FPV plane that can't really carry a full OSD. All you really want in those cases is for your tracking antenna to point at the plane accurately and have GPS positional data along with vital statistics such as battery voltage and current consumption.

TinyTelemetry is a minimal GPS locator that sends EzTelemetry data for the EzAntennaTracker down one of the audio channels on the audio/video transmitter. The EzAntennaTracker will then track the plane and offer battery statistics on its LCD display as well as other telemetry data such as positional info etc.
The new v2.0 EzAntennaTracker will also offer audible warnings for battery voltage and total current consumption.

The Tiny Telemetry plugs into the transmitter's dongle power supply located on the back of the transmitter.

Specifications

Headset Specifications

Optics:	FOV 35 degrees diagonal Interpupillary (IPD) distance: 59 – 69 mm (adjustable) Optional diopter lens inserts available in -2, -4, -6 dp	***Mechanical***	Ergonomic molded shape. Rubber eye cups for ambient light shielding Weight: 150g Adjustable headband
Audio:	Stereo	***System:***	NTSC/PAL auto select (interlaced) Two full color micro VGA LCD's (640 X 480 dots), 922k pixels
User Controls	Channel selection Display adjustment Head Tracker reset/menu nav	***Head Tracker***	Magnetic, gyro, accelerometer Trinity 9DOF, 3 axis head tracker
Electrical	Power supply, 7-13V (2S/3S supply) Power consumption: 350mA	***Receiver***	CH1: 5740MHz CH2: 5760MHz CH3: 5780MHz CH4: 5800Mhz CH5: 5820MHz CH6: 5840Mhz CH7: 5860 MHz
Antenna	5G8 3dBi dipole (circular polarized compatible)	***Interface***	3.5mm 4p AV in/out port Power in port (barrel connector. Center pin is +'ve, collar is GND) 3.5mm 3p Earphone port PS/2 DIN data (HT) port

Transmitter Specifications (V3):

Electrical	Power supply: 7 - 17 V (2S/3S/4S supply) Power consumption 310mA @7.4V Power out (to camera) 5V, 350mA maximum Transmitting power: 250mW	***Antennae***	External dipole (circular polarized compatible)
RF	CH1: 5740MHz CH2: 5760MHz CH3: 5780MHz CH4: 5800Mhz CH5: 5820MHz CH6: 5840Mhz CH7: 5860 MHz	***Mechanical:***	55 X 26 X 11 mm Weight: 22g (with antenna).

Camera Specifications:

Electrical	Power supply: 3.5 - 5 V Power consumption 60mA @5V	***Lens***	2.8mm IR coated 100°diagonal FOV (ideal for fixed camera)
Imager	1/3" CMOS 600TVL FPV tuned light handling NTSC/ PAL selectable (jumper on = PAL).	***Mechanical:***	Square: 21 X 21 X 12mm Lens extrude: 15mm X 14mm diameter Weight: 15g

Operational advice

- **For best performance**, select a channel that has the least amount of interference. While the transmitter is turned OFF, turn on the video headset and look at the screen as you check each channel. Clear channels will have a consistent static background. Channels with interference will have horizontal static lines.
- **Always perform a range test before flying**. This includes AV and RC controls. Some RC receivers can be affected by the proximity of other electronic devices particularly the AV TX.
- Try to space out your components as much as possible to avoid interference to your RC control range (keep stuff away from RX)
- Until experienced, practice flying in a familiar area to avoid becoming disorientated.
- Due to antenna characteristics, there is a "null" in line with antenna direction. You may experience excessive video breakup when flying overhead
- 5.8Ghz signal strength drops off very fast, stay safely within solid AV range.
- **For maximum distance** it is very important that a clear line of sight exists between the transmitter and the video headset. 2 of the worst causes of interference are human bodies and reinforced concrete.
- Place your TX antenna in open area in a vertical orientation
- **Multipathing** (reflections off buildings/ tall objects) causes signal cancellation and result in broken video. Fly in open areas away from buildings or other tall structures (i.e. barns, hills).
- **5.8Ghz AV with 2.4Ghz RC controllers:** 2.4Ghz may cause harmonic interference on Ch2 – Ch7 of the 5.8Ghz AV (Ch1 not affected). The headset has been equipped with a high pass filter that will allow the system to work with CE certified 2.4Ghz RC controllers. However, the filtering may be insufficient to remove noise from overpowered non CE certified controllers.
  If you experience interference from your RC radio, change the AV channel to channel 1.
- Although you don't require any license to operate this device, you are still legally responsible for operating in a responsible manner.

Warranty

The system can be exchanged for a new unit within 30 days for any manufacturing defects if returned in new condition. The video headset will be warranted for repair for 2 years if no signs of excessive use. Buyer will be responsible for shipping costs. If beyond the warranty period we will provide repair services.

Trouble shooting

If your problem can't be solved here, please visit our support forum at www.FPVLAB.com under SPONSORS GATE/ FAT SHARK RC VISION SYSTEMS. Any direct support enquires will be first directed to this forum for the benefit of all customers

Observation	Possible cause/solution
No image, display is completely dark	- No power supplied. Check power connections.
No image, display is glowing dark grey	- If using wireless module, turn on RX power on bottom of headset. - If using AV in cable, check video source. - Ensure TX is on and camera connections solid - Ensure lens cap is removed from camera - Trying to power a 12V camera with the 5V TX supply (need to connect 12V camera direct to RC pack.
Complete white screen	LCD driver has failed and needs to be replaced under warranty. Contact your retailer.
Lots of interference lines (horizontal lines)	- Choose a cleaner channel.
Lots of interference lines (horizontal lines) when using 5.8Ghz receiver	Check to see if cause is harmonic interference from 2.4Ghz RC controller (turn radio on/off). - Use CH1 on TX/headset (Ch1 not affected by 2.4Ghz) - check correct frequency antenna is used
Head tracker not working but can hear beeps (can enter and navigate beep menu)	- Ensure headset is turned on before RC radio - Review controller manual for correct settings - Check servos are plugged into correspondingly selected channels
Head tracker not working, and no beeps (can't enter nor navigate beep menu)	- Cable was modified and resulted in voltage applied to signal line (fried HT) - Mated to an aftermarket channel mixer and wired wrong resulting in voltage applied to signal line - Incorrect installation of aftermarket UHF RC system resulting in voltage applied to signal line .
Head tracker stops working after short time	Auto disengage function activated. Follow menu instructions to turn off.
Short range	- Ensure 5.8Ghz antenna were installed - Turn off transmitter and check for other sources of interference - Ensure transmitter has clear LOS to headset. Test in wide open area, away from any obstructions
Short range (con't)	- Ensure that a compatible antenna is installed. Do not use other manufacture antenna, they may be dual band or may be reverse SMA (no center pin to connect to receiver)
White dots on LCD display	Goggles lens were left exposed to sun allowing magnified sunlight to burn off LCD color filter.